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1 December 1965

MEMORANDUM FOR THE RECORD

SUBJECT: Evaluation of [redacted] Automatic Focusing Feasibility Study. 25X1

1. [redacted] proposed to investigate the feasibility of employing their correlation detector in a device which would automatically focus the lens of an optical system. Essentially the detector would sample the light intensity in the image plane (or in a simulated image plane) and automatically determine if the projection lens was at the position of best focus for this particular image plane. A contract was negotiated with [redacted] to determine the feasibility of utilizing a correlation detector for this task. 25X1 25X1

2. Early in the program, the contractor found that he had erred in his mathematical analysis in assuming that the product of the light intensities projected on two cells was much greater than their sum. It was later shown by empirical results that this assumption was not true; therefore, only a non-linear photocell could be successfully employed in this system.

3. [redacted] did prove that it would not be feasible to employ their linear correlation detector and this technically satisfied the terms of the contract; however, they continued their investigations and the results of the final report show that a non-linear photocell can be utilized as the detector for an automatic focusing system. 25X1

4. [redacted] report shows that their present non-linear photocells are responsive to medium contrast -- in the range of 10-1 -- complex aerial images. The cells create a linear voltage response for object position variations of up to ± 1/16 inch. Although these results are promising, the contractor is far from being in a position to build a prototype auto-focusing system. 25X1

5. Before prototype development can be undertaken, further investigation must be made into the response characteristics of [redacted] photocell. Among the parameters that should be established are the following: 25X1

A. What is the time response of the cell?

B. What is the autofocus sensitivity?

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C. What is the signal drift?

D. Can such a focusing system be adapted to present viewers?

E. Can the present parameters be increased?

More specifically:

1. Can the present resolution capabilities of 4 line pairs/mm be substantially increased?

2. Can the contrast ratio response be reduced to at least 2:1?

3. Can the sensitivity to object position motion be increased to at least ± 1/4 inch?

6. With the above discussion in mind, it is recommended that an additional study be undertaken to establish these and other necessary parameters. Under any additional study contract, the contractor should be directed toward orienting the study to a specific piece of equipment; for example, an [redacted] Rear-Projection Viewer. The study should be a two phase effort; (1) to establish the listed parameters and (2) to breadboard the system with the specific equipment in mind. This second phase would allow the contractor to attack the general problem, but work to specific requirements. This phase should also include an investigation of the feasibility of adapting the breadboarded system to a list of specific NPIC equipment such as enlargers, other rear-projection systems, direct viewing equipment, etc. 25X1

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[redacted]
Development Branch, P&DS